Underground Injection Control Update

Providing information about the Utah Underground Injection Control (UIC) Program.

Prepared by the Utah Department of Environmental Quality, Division of Water Quality *Summer 2005*

Welcome…

…to the first issue of the quarterly, or at least occasional, newsletter of the Utah Underground Injection Control (UIC) Program – the Utah Underground Injection Control Update, or the UIC Update, for short. Why a newsletter? We receive numerous inquiries on issues relating to the UIC Program. So through the use of Mail Merge and/or Email Groups, we decided a newsletter would be the most efficient and effective vehicle for answering questions and disseminating educational, relevant, and, dare we say, updated information to those of you "involved" with UIC-regulated facilities. We'd like to use the UIC Update as a forum for both collecting *and* answering questions because your questions are more than likely some one else's as well. So let's begin with our first one…

What IS the UIC Program?

Part C, Sections 1421 - 1426 of the Safe Drinking Water Act (SDWA), which was signed into law by Congress on 17 December 1974, authorized the US EPA to establish the Underground Injection Control (UIC) Program and to develop minimum program requirements to prevent underground injection that endangers underground sources of drinking water.

Underground Injection…
means the subsurface emplacement of fluids through a bored, drilled, or driven shaft or dug hole whose depth is greater than the largest surface dimension **or** an improved sinkhole **or** a subsurface fluid distribution system consisting of an assemblage of perforated pipes, drain tiles, or other similar mechanisms intended to distribute fluids below the surface of the ground.

(UAC R317-7-2 and 40CFR144.3)

Underground Source of Drinking Water…
or USDW means an aquifer or portion thereof which:

(a) (1) Supplies any public water system; **OR**
(2) Contains a sufficient quantity of ground water to supply a public water system; **AND**
(i) Currently supplies drinking water for human consumption; **OR**
(ii) Contains fewer than 10,000 mg/l total dissolved solids (TDS); **AND**

(b) Is not an exempted aquifer as designated according to the procedures in 40CFR144.7.

(UAC R317-7-2 and 40CFR144.3)

From the beginning, the UIC Program has been divided into two parts. Sections 1421(b)(2) and 1422(c) of the SDWA prohibited any regulatory requirement that would "interfere with or impede" (clarified to mean "stop or substantially delay") underground injection in connection with oil and natural gas production or secondary or tertiary recovery of oil and gas production unless such requirements were essential to assure that USDWs would not be endangered by the injection. In response to this statutory mandate, EPA classified all such wells as Class II injection wells and Class II regulatory requirements were developed under a 1981 Amendment to SDWA (Section 1425).

In Utah, the Department of Environmental Quality, Division of Water Quality (DEQ/DWQ), administers the Section 1422 UIC Program for Class I, III, IV, and V injection wells having received primacy from EPA on 10 February 1983. The Utah Department of Natural Resources, Division of Oil, Gas, and Mining (DOGM) administers the Section 1425 UIC Program for Class II injection wells (see Major Classes of Injection Wells information box).

Under the UIC Program, underground injection activities are prohibited that might contaminate USDWs by causing exceedances of primary drinking water regulations

Standard for Protection for the UIC Program

The following excerpt from 40CFR144.12 applies to all injection wells:

No owner or operator shall construct, operate, maintain, convert, plug, abandon, or conduct any other injection activity in a manner that allows the movement of fluid containing any contaminant into underground sources of drinking water, if the presence of that contaminant may cause a violation of any primary drinking water regulation under 40CFR142 or may otherwise adversely affect the health of persons. [40CFR141 establishes primary drinking water regulations (MCLs and MRDLs) for various constituents in drinking water. 40CFR142 establishes regulations for implementing and enforcing 40CFR141]

(UAC R317-7-5.3 and 40CFR144.12(a))

(Maximum Contaminant Levels (MCLs) and Maximum Residual Disinfectant Levels (MRDLs)) in the USDWs impacted by the injection activity. The standard for protection for the UIC Program is stated in 40CFR144.12(a). Additional requirements regarding prohibited injection specific to Class I, II, III, and V are in sections (b) through (d) of 40CFR144.12.

References

USEPA Technical Program Overview: Underground Injection Control Regulations, December 2002
http://www.epa.gov/safewater/uic/pdfs/uic_techovrview.pdf

Summary of the History of the UIC Program at:
http://www.epa.gov/safewater/uic/history.html

40CFR144
http://www.access.gpo.gov/nara/cfr/waisidx_03/40cfr144_03.html

Safe Drinking Water Act (SDWA)
http://www.epa.gov/safewater/sdwa/index.html

What are Injection Wells?

This may seem like a simple enough question to which you may expect a simple enough answer, but there ARE complexities, as you will see. So set aside your pre-conceived notions of what a "well" is and READ ON!

Regulatory Definition

According to 40CFR144.3, a well, for the purposes of the UIC Program, is a **bored, drilled, or driven shaft or dug hole** whose depth is greater than the largest surface dimension; or, an **improved sinkhole**; or, a **subsurface fluid distribution system**.

?? Improved Sinkholes ??

A "bored, drilled, or driven shaft or dug hole" is easy enough to visualize, but what about an "improved sinkhole"? The term "improved sinkhole" is somewhat misleading since, at least in the realm of the UIC Program, it includes more than a collapse structure resulting from the dissolution of underlying limestone or salts. Extensive development of these types of sinkholes result in karst topography, a classic example of which occurs in the landscape around Mammoth Caves in Kentucky. An improved sinkhole includes any naturally-occurring conduit, fissure, crack, or crevice extending into the subsurface that has been subjected to anthropogenic modification for the purpose of directing and emplacing fluids into the subsurface. Typically, these are employed for the management of storm water and agricultural runoff although other uses exist.

?? Subsurface Fluid Distribution Systems ??

If improved sinkholes represent a departure from the usual conception of a well, "subsurface fluid distribution systems", which are generally horizontal in their orientation with the ground surface, are even farther departed. Again, according to 40CFR144.3 these consist of "an assemblage of perforated pipes, drain tiles, or other similar mechanisms intended to distribute fluids below the surface of the ground." These include infiltration galleries and drain fields and drainage trenches associated with on-site wastewater disposal systems. Subsurface fluid distribution systems **DO NOT** include infiltration trenches or surface impoundments or ditches, typically employed for storm water management. Even though these systems are designed to distribute fluid to the subsurface, they themselves are not considered to exist in the subsurface. **Infiltration trenches** are excavated trenches filled with stone, with no piping or drain tile, and at least one surface dimension that exceeds depth. **Surface impoundments or ditches** are excavated ponds, lagoons, and ditches, either lined or unlined, but with no associated perforated piping or drain tile to facilitate drainage to the subsurface. HOWEVER, if an infiltration trench, surface impoundment or ditch includes subsurface perforated pipe or drainage tile, they are… subsurface fluid distribution systems.

Injection Well Classes

Hopefully, the discussion above has served to clarify what generally is and is not an injection well. Continuing, injection wells are grouped into 5 classes. Although there are general program requirements that apply to all injection wells, specific regulations have been developed for each major class. See the Major Classes of Injection Wells information box for a general description of each injection well class.

Class V Injection Well Subclasses

Class V injection wells constitute the largest class of

Major Classes of Injection Wells

Class I

Wells used to inject hazardous, non-hazardous industrial, municipal, or radioactive waste below the lowermost formation containing, within 2 miles* of the well bore, a USDW.

Class II

Wells used to inject liquid, at standard temperature and pressure, hydrocarbons for storage; fluids for enhanced recovery of oil or natural gas (NG); and fluids brought to the surface in connection with NG storage operations or conventional oil or NG production and may be commingled with wastewater from gas plants which are an integral part of the production operations, unless those waters are classified as a hazardous waste at the time of injection.

Class III

Wells used for the solution mining of salts or potash; mining of sulfur by the Frasch process; and in-situ production of metals, including uranium, from ore bodies that have not been conventionally mined.

Class IV

Wells used to dispose of hazardous or radioactive waste into or above a formation containing, within 2 miles* of the well, a USDW.

Class V

Wells that are not included in Classes I, II, III, or IV.

(UAC R317-7-3 and 40CFR144.6)

* Utah has adopted a distance of 2-miles instead of the federal ¼-mile distance.

Subclasses of Class V Injection Wells

Drainage Wells
- Agricultural Drainage Wells (5F1)
- Storm Water Drainage Wells (5D2)
- Improved Sinkholes (5D3)
- Industrial Drainage Wells (5D4)
- Special Drainage Wells (5G30)

Geothermal Re-Injection Wells
- Electric Power Re-Injection Wells (5A5)
- Direct Heat Re-Injection Wells (5A6)
- Heat Pump / Air Conditioning Return Flow Wells (5A7)
- Ground Water Aquaculture Return Flow Wells (5A8)

Domestic Wastewater Disposal Wells
- Untreated Sewage Waste Disposal Wells (5W9)
- Large Capacity Cesspool (5W10)
- Septic Systems (Undifferentiated Disposal Method) (5W11)
- Septic Systems (Well Disposal Method) (5W31)
- Septic Systems (Drainfield Disposal Method) (5W32)
- Domestic Wastewater Treatment Plant Effluent Disposal Wells (5W12)

Mineral and Fossil Fuel Recovery Wells
- Mining, Sand or Other Backfill Wells (5X13)
- Solution Mining Wells (not Class III wells) (5X14)
- In-Situ Fossil Fuel Recovery Wells (5X15)
- Spent-Brine Return Flow Wells (5X16)

Industrial/Commercial/Utility Disposal Wells
- Cooling Water Return Flow Wells (5A19)
- Industrial Process Water and Waste Disposal Wells (5W20)
- Motor Vehicle Waste Disposal Wells (5X28)

Recharge Wells
- Aquifer Recharge Wells (5R21)
- Saline Water Intrusion Barrier Wells (5B22)
- Subsidence Control Wells (5S23)

Miscellaneous Wells
- Radioactive Waste Disposal Wells (5N24)
- Experimental Technology Wells (5X25)
- Aquifer Remediation Related Wells (5X26)
- Abandoned Drinking Water Wells (5X29)
- Other Wells (5X27)

(Modified after Table 1-1 of *Report to Congress: Class V Injection Wells Current Inventory; Effects on Ground Water; Technical Recommendations*, September 1987)

injection wells, both in the number of business sectors represented and in the total number of wells. The Subclasses of Class V Injection Wells information box lists the 30 subclasses of Class V injection wells identified in the September 1987 *Report to Congress: Class V Injection Wells Current Inventory; Effects on Ground Water; Technical Recommendations*. The numbers in parentheses after each subclass name is the EPA Well Code assigned to that well subclass. Not all subclasses are represented in Utah.

In the late 1990s, EPA conducted an extensive study of Class V injection wells. The result of that study was a 23-volume report with 5 appendices, published in September 1999, in which background information on more than 20 types of Class V injection wells was presented. The entire Class V Study is available online (see References). EPA used the results of this study to determine the necessity for additional regulation. As a result motor vehicle waste disposal wells and large-capacity cesspools were banned.

Future articles in the Utah UIC Update will focus on different well classes and subclasses.

References

40CFR144.3
http://www.access.gpo.gov/nara/cfr/waisidx_03/40cfr144_03.html

When are Storm Water Discharges Regulated as Class V Wells?
http://www.epa.gov/safewater/uic/pdfs/fact_class5_stormwater.pdf

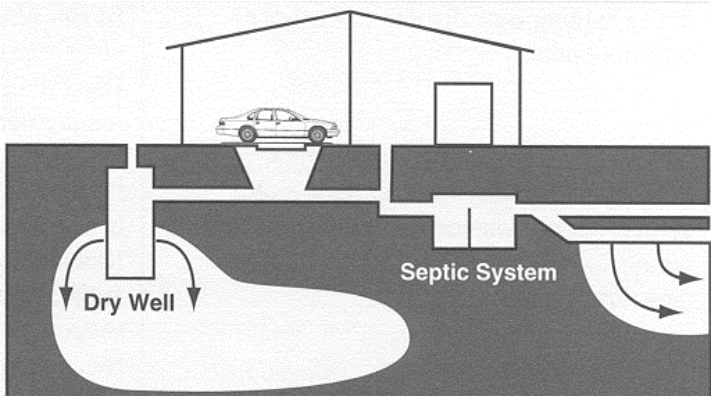
The Class V Underground Injection Control Study
http://www.epa.gov/safewater/uic/cl5study.html

MVWDWs and LCCs are Banned!

On 7 December 1999, EPA finalized revisions to the Class V injection well regulations banning the construction of new **Motor Vehicle Waste Disposal Wells** (MVWDWs) and **Large Capacity Cesspools** (LCCs) after 5 April 2000. Existing LCCs must be closed by 5 April 2005. Existing MVWDWs must be closed no later than 1 January 2007. A one-year extension to this deadline may be granted provided the operator indicates, in writing by 1 January 2007, the intent to connect to a sanitary sewer system.

?? Motor Vehicle Waste Disposal Wells ??

According to 40CFR144.81(16) MVWDWs "receive or have received fluids from vehicular repair or maintenance activities, such as an auto body repair shop, automotive repair shop, new and used car dealership, specialty repair shop (e.g., transmission and muffler repair shop), or any facility that does any vehicular repair work. Fluids disposed in these wells may contain organic and inorganic



Examples of Motor Vehicle Waste Disposal Wells

Source of Graphic: USEPA UIC Website

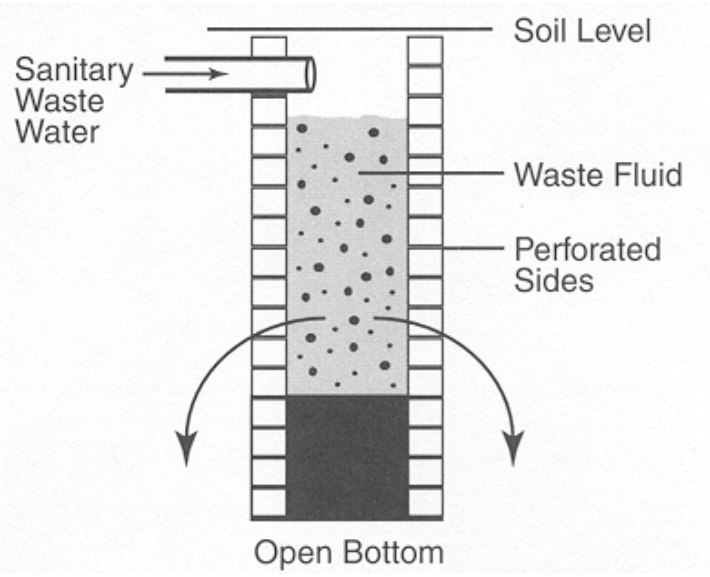
chemicals in concentrations that exceed the maximum contaminant levels (MCLs) established by the primary drinking water regulations (see 40CFR141). These fluids also may include waste petroleum products and may contain contaminants, such as heavy metals and volatile organic compounds, which pose risks to human health."

Typically, MVWDWs are floor drains or sinks in service bays that discharge to shallow disposal systems such as dry wells or septic systems. Other names that describe shallow disposal systems are: cesspools, catch basins, sinkholes, underground vaults, or drain tanks to name a few. It is important to note that MVWDWs are defined by the type of waste they receive (fluids from vehicular repair and/or maintenance) rather than the type of construction.

?? Large Capacity Cesspools ??

According to 40CFR144.81(2), LCCs include "multiple dwelling, community or regional cesspools, or other devices that receive sanitary wastes, containing human excreta, which have an open bottom and sometimes perforated sides. The UIC requirements do not apply to single family residential cesspools nor to non-residential cesspools which receive solely sanitary waste and have the capacity to serve fewer than 20 persons a day." It is important to recognize the distinction between cesspools, which provide essentially no treatment of sanitary waste, and septic systems, in which septic tanks remove floatable and sinkable solids and promote partial digestion of organic material by anaerobic processes and in which the adsorption fields further treat the septic tank effluent through biological processes, adsorption, and filtration in the subsurface prior to ultimate discharge to USDWs. In general, large-capacity cesspools may be found in the following places:

- multi-family residential units



Example of a Large Capacity Cesspool

Source of Graphic: USEPA UIC Website

- churches, schools, and public meeting facilities
- office buildings
- industrial and commercial buildings
- shopping malls hotels and restaurants
- highway rest stops
- state parks and camp grounds
- train and bus stations

In Utah, cesspools have been banned since the 1960s.

Additional information about the New Class V Rule pertaining to MVWDWs and LCCs is available on the Utah UIC Web Page (see below) and the EPA's New Class V Rule page (see References).

References

Federal Register; Vol. 64, No. 234; Tuesday, December 7, 1999 (64 FR 68545 – 68573)

40CFR144.81
http://www.access.gpo.gov/nara/cfr/waisidx_03/40cfr144_03.html

New Class V Rule
http://www.epa.gov/safewater/uic/c5imp.html

Small Entity Compliance Guide: How the New Motor Vehicle Waste Disposal Well Rule Affects Your Business.
http://www.epa.gov/safewater/uic/smallcompliance.pdf

Onsite Wastewater Treatment Systems Manual
http://cfpub.epa.gov/owm/septic/home.cfm

Utah UIC Online!!

The Utah UIC Program is on the Internet! Visit us at:

http://waterquality.utah.gov/UIC/UICHome.htm

Learn more about the National and Utah UIC Programs, download permit applications and the UIC Inventory Information Form, get contact information, access the Utah UIC Administrative Rules and other associated rules, link to many useful resources, and check out the glossary of UIC-related terms.

Submit Your Questions and Comments

If you have questions or comments regarding the Utah UIC Program, are not sure if a discharge qualifies as a UIC-regulated activity, are frustrated and/or utterly confused (about the UIC Program), PLEASE drop us an email or otherwise contact us so that we can clear things up.

Send Us Your Contact Information

If you would like to receive (or not receive) this newsletter by email or by surface mail, send your contact information along with your preference to Candace Cady at ccady@utah.gov . All UIC Updates will be archived on the Utah UIC Web Page.

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Inside this Issue…

Next Issue…

Large Capacity Septic Systems OR Why is the ***horizontal*** leach field at my business establishment considered an injection well but the horizontal drain field associated with my septic system at home is ***NOT***?

?? Questions ??

Contact Candace Cady at
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Utah UIC Online

http://waterquality.utah.gov/UIC/UICHome.htm